

MICHIGAN ENVIRONMENTAL SCIENCE BOARD
MERCURY PANEL

MEETING SUMMARY
TUESDAY, JANUARY 26, 1993
ROOM A271, PLANT AND SOIL SCIENCE BUILDING
MICHIGAN STATE UNIVERSITY
EAST LANSING, MICHIGAN

BOARD MEMBERS PRESENT:

Dr. Lawrence Fischer, Chair
Dr. Jonathan Bulkley
Dr. Richard Cook
Dr. Raymond Demers
Dr. David Long
Dr. Ronald Olsen
Dr. Bette Premo
Dr. Eileen van Ravenswaay
Dr. George Wolff

BOARD MEMBERS ABSENT:

None

BOARD STAFF PRESENT:

Mr. Keith Harrison, Executive Director
Ms. Sharon Picard, Financial Officer

I. CALL TO ORDER

Dr. Lawrence Fischer, Chair, called the meeting of the Michigan Environmental Science Board Mercury Panel to order at 1:15 pm.

II. EXECUTIVE DIRECTOR'S REPORT

Mr. Harrison introduced Lynelle Marolf, newly appointed liaison to the Board from the Department of Natural Resources. Mr. Harrison indicated that it will be her role to facilitate communications between the Department and the Board. She will be the Board's contact person when it needs information from the Department and vice versa. Mr. Harrison indicated that Mr. Hal Humphrey serves in a similar capacity with the Department of Public Health. Ms. Marolf indicated that she looked forward to working with the Board.

III. PANEL MEMBER DRAFT ASSIGNMENTS

The first item of discussion was the Governor's first directive to the Board: Compile existing data regarding the levels of mercury found in Michigan's environment and estimate the risk those levels pose to the health of Michigan's citizens.

Dr. Long presented the results of his review of Red Evans' (MDNR) data on inland lakes, as well as on the data base that has been accumulating on mercury in the Great Lakes (Attachment 1). Preliminary analysis shows that background concentrations in the inland lakes are significantly higher than the Great Lakes as a whole. The range of values in the terrestrial lakes is also wider than the Great Lakes. These findings point to the gap in knowledge about terrestrial processing of mercury. Background was defined as the point in the profile of a metal when the concentration becomes steady, where variation is limited; not necessarily the lowest concentration.

He concluded that overall there has been an increase of mercury in the environment. However, this conclusion must be tempered into one caveat. Mercury and lead behave similarly in all these lakes. When mercury increased, lead increased. The loading of lead to the environment has decreased in recent times, and so the lakes should show a decrease in lead. The fact that they show an increase makes it suspect that the lakes' records are not complete, probably because the sedimentation rates in the lakes are slow, so that in a small sample of lake water, there may be ten years worth of data combined. The amounts of increase in individual lakes since pre-industrial times based on these data varies from .8 to 6.7, with the average at about 2 times greater. In a few weeks Dr. Long will have the analysis of cores from some of the lakes that will have the increments necessary to say what has happened over the past 10 to 20 years. At this point, because the problem of the increase in lead in the samples, the most that can be safely said is that there has definitely been an increase of mercury in the environment, but the exact magnitude of recent changes cannot be stated. Dr. Long concluded by stating that the average mercury concentrations in the lake sediments is well within the range that has been found for average sediments and soils in the U.S.

Dr. Wolff stated that he noticed from his review of the same data that along with lead, almost all the other metals showed the same trend of increase. He agreed that the Red Evans' data could not be used to make any statement about trends within recent times, only that there had been an increase in the past hundred years.

Dr. Wolff presented his paper on mercury concentrations in the air (Attachment 2). The data on atmospheric mercury are from Dr. Jerry Keeler, University of Michigan School of Public Health. It is the only source of air data in Michigan that Dr. Wolff is aware of. Mercury exists in two different phases in the atmosphere, gas and particulate. More than 90% is in the gas phase, and most of that is elemental mercury. The particulate phase is generally less than 5% and is primarily in the form of an oxidized mercury plus two species, which is water soluble.

Measurements from rural sites and a small urban area, Ann Arbor, show total airborne mercury near levels considered to be global background. Data from Detroit and

Chicago show higher concentrations of total mercury, most likely due to emissions from local anthropogenic sources. Both gaseous and particulate forms show significant increases. Even these higher concentrations are several orders of magnitude below levels that would pose a risk to human health through inhalation. There are no data to indicate how far downwind from the urban areas elevated concentrations exist. However, data collected at South Haven and in the middle of Lake Michigan, which are at times downwind of Chicago, showed no evidence of a strong plume arising from Chicago. It appears that the influence from urban areas

is quite limited. There are no data available on temporal trends, largely because the methodology required to measure these ultra clean levels did not exist until recently, but it is thought that emissions are declining.

There are precipitation data from three sites, Ann Arbor, South Haven, and Pellston. Mean concentrations of mercury in the rain were approximately the same, 12 ng/l. This is only slightly above the 3-10 ng/l that is considered clean background, which is a consensus of values from rural areas worldwide. There are no data on rain in urban areas, or on whether rain-out produces high local effects around urban areas. There is some seasonal variation of ambient mercury concentrations. Data from rural Tennessee show that concentrations are dominated by temperature. There is a high correlation between daily temperature and total mercury.

Dr. Bulkley presented his comments on mercury in the environment (Attachment 3). He stated that there are recommendations in the New Jersey report that should be considered when answering the Governor about human health risks. In addition, the draft toxicological profile for mercury by the Agency for Toxic Substances and Disease Registry (ATSDR) is of critical importance. The risk of mercury levels in Michigan seems to be primarily associated with the consumption of fish in which mercury has been bioaccumulated and these fish are found in both inland lakes and rivers and the Great Lakes. The ATSDR has proposed an order of magnitude reduction in the standard for acceptable daily intake (ADI) of methylmercury from the present USEPA limit of .3 ug/kg/day to a reduced ADI of .04 ug/kg/day. USEPA has withdrawn the .3 ug/kg/day standard for re-evaluation. The Panel may want to wait to write recommendations until the USEPA takes action on the standard. If the ADI is reduced to the level recommended by the ATSDR, the risk posed by consumption of fish in Michigan may require a ban on consumption by certain elements of the population.

Dr. Fischer responded that he disagreed with the risk assessment methodology New Jersey used, which lowered acceptable daily intake to .07 ug/kg/day, background level. The data from Japan and Iraq do not support negative health effects at that low level. Risk assessments being used are typical of those used with organic chemicals and are based on the application of either large safety factors or very conservative assumptions. When such methods are applied to metals, ADIs are taken down to the background range. It's a problem that has to be dealt with. The New Jersey report says the data on mercury are good, then applies huge safety factors and assumptions that are normally made when the data are not good.

Dr. Premo presented her comments (Attachment 4). She stated that she recognized the usefulness of the information provided to the Panel in the MDNR report, the review of the nationwide sources of mercury provided by Clean Water Action, and the additional presentations and written materials provided to the Panel. She suggested that the material be compiled by Mr. Harrison. She discussed the Red Evans' data on eagle feathers. The mercury concentration in adult eagle feathers in the Great Lakes region was around 22 mg/kg. In eaglets it was about 18 mg/kg.

Dr. Demers stated that he was still uncomfortable with the lack of data available on humans. The ATSDR has been criticized for its method of risk assessment, so the lower ADI they have recommended should be viewed with some caution; however, since the ATSDR is a public health agency, its input should be considered. He went on to say that, in addition to human exposure to mercury through fish, other routes of exposure may be considered. There is an occasional inhalation exposure from an industrial accident, and off-gassing from indoor paint may still be a problem for children.

Currently the methylmercury in fish poses a very minimal human hazard, but the Panel cannot stop with that statement, since there is little known about environmental time trends and nothing known about time trends in human contamination. Dr. Demers thinks the Panel should endorse the Algonac effort to collect human exposure data. He has reviewed the questionnaire included with that study and finds no items that can be re-analyzed. He supports the document he and Dr. Fischer presented at the last meeting, "Methyl Mercury Exposure and Conclusions Relative to Human Health", with a few minor additions. In the 11-20 ppm in hair group, instead of saying that no effects are likely but precautions should be taken, he would now say that precautions, as yet undefined, are needed and would certainly suggest advisories to populations at risk. He pointed out that there is no treatment for any exposure short of very high levels, since chelation is hazardous. He also noted that some lakes, specifically Deer Lake and Smokey Lake, described in the report, contained fish with fairly high mercury levels, and that populations consuming a fair amount of them -sports fishers, the impoverished who depend on them for protein, and Native Americans - are at risk.

Dr. Cook asked if, in addition to outgassing of mercury from interior paint, disturbance of old paint could lead to acute exposures. Dr. Demers answered that because of the small amounts of mercury in paint this would not be a major concern.

Dr. Olsen indicated that the inconclusive nature of the data the Panel is working with needs to be communicated with the recommendations it makes. He went on to say that little is known about methylation. There is some speculation, based on a study some Panel members have mentioned, that mercury is being methylated in sediments by the enteral process. It is well known, however, that the common process is the reverse; mercury is converted to mercury zero by almost every micro-organism, including those in sediments as well as soils. Almost every antibiotic resistant bacterium seen now has a cognizant resistance to mercury, suggesting either that mercury is pervasive in nature and bacteria have learned to live with it, or as in the case of mercury contaminated 2-4-

D, has led to its emergence in those bacterium. He suspects that the resistance has emerged. Other metal resistances are also showing up, and none of these are found in archival collections of bacteria. This suggests that mercury resistance is an adaptation and is occurring terrestrially, where these bacteria live. Methylmercury is being removed terrestrially, but the process is also creating mercury zero, which is volatilizing.

There may be a terrestrial mercury cycle that is a subset of more global considerations. At any given time there is a higher localized content of mercury in the air than can be accounted for, based on air flow over the area. Although it is assumed that background is relatively stable, Dr. Olsen has the impression it may be increasing, or at least changing. Biological activities may be the vehicle of the change. There is more mercury in the air in Michigan than can be accounted for by local inputs or the contribution of, say Chicago. One cycle may be in operation in lakes in the formation of methylmercury.

Dr. Long asked whether the bacteria seen in laboratories have gotten their mercury resistance from the previous use of heavy metals in pesticides. Dr. Olsen responded that yes, acquisition of resistance is running ahead of evolution. The DNA in the bacteria are the same as that of 2-4-D grading bacteria.

Dr. Fischer noted that there appears to be no relationship between mercury input to a lake from the atmosphere, mercury in the water, and methylmercury in fish. Human exposure cannot be predicted easily from levels in air or water. People have mentioned a number of factors that determine the amount of methylmercury that eventually gets into fish - inorganic matter in lakes, pH, etc. So monitoring for total mercury cannot predict ultimate exposure.

Dr. Olsen responded that that ignores cause and effect relationship. If cause is in sediment, sediment should be monitored. Measuring water-borne mercury only tells what is there at that point in time, not what will be there in the future.

Dr. Fischer asked whether there were any responses to the observation that knowing mercury loadings to the environment is not useful in predicting exposure routes or levels of human and wildlife exposure. Dr. Long agreed that the total presence of metals in the environment at a given time does not indicate their bioavailability. Therefore, risk assessment using total mercury levels is not adequate.

Dr. Fischer gave his summary of human health risk (Attachment 5). The data on health effects are from methylmercury poisonings. The data from those events pertinent to determining a threshold level for adverse health effects are not extremely good, but are better than for most issues in environmental toxicology. He did not feel there was a public health threat from mercury at this point. It is hard to determine what the case will be in the future, since there is no good information about the rate of increase in mercury exposure in human or wildlife populations. The Panel needs to make recommendations that will help to end the uncertainties involved in the question. The Panel needs to

know what the mercury levels in Michigan's population are, particularly among the most susceptible groups -women of childbearing age and pregnant women.

From the Japan and Iraq data, it is known that the primary effect of methylmercury exposure is arrested development of the central nervous system. The only information about Michigan is from studies of people in Algonac, on the eastern side of the state, and South Haven, on the Lake Michigan side, where fish consumption and blood mercury were assessed in the early 1970s. It was found that those from the Lake Huron side had much higher mercury levels per pound of fish consumed, since the fish in Lake St. Clair were more contaminated than those from Lake Michigan. The Algonac people included in the study who were consuming over 70 pounds of fish per year had an average blood level of 78 ppb. The Grand Haven fish eaters had 15 ppb mercury in their blood - probably background levels. People consuming 70 pounds a year of contaminated fish could easily have hair levels of 20 ppm, which is the threshold for observation of adverse effects in infants in Iraq. There were no other groups in the Michigan study that approached that level.

Dr. Fischer stated that his approach to calculating risk may be different than that used by public health officials. He leans toward estimating the real risk rather than assuming a series of worse cases and making the most conservative assumptions, thus inflating the true risk for the purpose of protecting public health. He wants to separate the issue of risk analysis from risk management.

Dr. van Ravenswaay asked whether Dr. Fischer meant risk to the average individual or risk to the most sensitive population. Dr. Fischer replied that he means to discuss the average of the sensitive population. And although the Iraq data are the best available, it is not clear that the 10-20 ppm in hair is really the threshold for adverse effects. Adverse effects are not clear until the 100 ppm level is reached. The 10-20 ppm, which was established by mathematical extrapolation rather than observation, is very conservative already. It is possible to reach the 10-20 ppm level in Michigan by eating large amounts of contaminated fish, although most of the fish that are eaten are not contaminated at that level. Swain and Helwig, based on limited data, estimated that mercury levels in fish in Minnesota may be increasing by .1 ppm per year. It is not known whether levels in Michigan are increasing at all, but assuming they are also increasing by .1 ppm per year, in 10-15 years, Michigan fish could reach a level of contamination that would be of concern to fish consumers in the average to high consumption range. Women of child-bearing age and fetuses would be at particularly high risk. Therefore, the Panel should make recommendations that the state: (1) take some actions to reduce current mercury levels, (2) take action to determine the rate of increase in the population, and (3) reduce mercury emissions to the atmosphere, particularly those that will result in higher mercury levels within the state. The severity of emissions controls will depend on the degree of regional or local impact from emissions into the atmosphere. If Michigan's burden cannot be reduced with state controls because emissions travel around the globe, then the state needs agreements with other states and countries to reduce emissions.

There are little good data about exposure or effects in wildlife, Dr. Fischer continued. He assumes, however, that by reducing human exposure, by lowering levels in fish, wildlife will also be protected.

Dr. Fischer stated that the human population in Michigan, particularly women of child-bearing age, has to be monitored so actual current levels can be discovered, then the monitoring continued until trends are known. He does not believe the cost will be prohibitive. The advisories for restricting fish consumption should continue, but the method of monitoring mercury levels in fish and in lakes should be examined to assure the current sampling and measurement processes are producing the kind of data really needed. He would also advise taking steps with other states in the Great Lakes region to limit mercury emissions. Whatever regulatory actions are taken should be linked to valid indices of contamination, based at least in part on monitoring fish and humans.

Dr. Premo added that it is also important to educate people on the meanings of the fish advisories and to be certain that the information is available and understandable to all populations.

Dr. Cook stated that, although as a chemist he could not comment much on the Governor's first directive, he was aware that in the past few years concerns have been raised about the possible effects of very low levels of exposure. He expressed concern that this point of view be taken into consideration, so that at least the Panel's recommendations do no harm.

Dr. Demers agreed that there is greater concern recently, due to increased knowledge about the neurological effects from lower doses. However, the guidelines he and Dr. Fischer are presenting conform to the World Health Organization guidelines and are about where other organizations are. They do think, however, that they may have to be re-evaluated, perhaps annually.

Dr. Fischer stated that he would like to see the level of regulation or restriction be linked to the risk analysis, so it changes with increased information about the risk. Controls should be adjusted based on the results of monitoring mercury levels in the human population. Although the state of New Jersey has added a large safety margin to its standards, as does the ATSDR, he said he was not sure the Panel should decide that margin of safety in Michigan, since that is a social and economic, not a scientific, decision. He wants to keep risk assessment separate from risk management. The calculation of risk should be public and based on data. The additional safety built in during the process of risk management should be public and defensible also.

Dr. Long agreed that assessment of mercury levels in the people of Michigan was of paramount importance. However, the problem will not really be dealt with by looking only at the end product of contamination. There is still little information available about all the possible pathways to humans and wildlife, including dental amalgams and occupational exposures. The links between emission of mercury to the environment and exposure to humans and animals are weak.

Dr. van Ravenswaay suggested that, although occupational exposure to mercury is not on the Panel's agenda, it is sensible to point out that specific sub-populations may want to consider their overall exposure to mercury over and above fish consumption.

Dr. Bulkley wanted to go on record that he cannot say there is no current public health problem from mercury. He cited a reference to Dr. Clarkson at the University of Rochester, who monitored his own consumption of mercury and its effects on his blood levels. He ate a half pound of northern pike containing 7 ppm of mercury, then monitored his blood level over 160 days. It went from less than 5 ppb to a maximum of 50 ppb within the first 12 hours, a very sharp spike. This is a dangerous situation for a fetus. Dealing with averages can obscure such dynamics.

Dr. Fischer asked for discussion on the Governor's Directive 4., "Propose and evaluate options for controlling or eliminating harmful emissions of mercury into the environment."

Dr. Wolff summarized what is known and unknown about how atmospheric sources of mercury that may enter surface waters by wet and dry deposition. First issue, is the amount of mercury in the rain sufficient to account for the amount of mercury found in the waters? The answer to this question is yes. Second issue, is there enough mercury in the air to account for the amount of mercury in the precipitation? There are two important forms of mercury measured in the air. There is gaseous elemental mercury and there is mercury plus two. In order for the mercury to get into a raindrop, you either have to take elemental mercury gas, put it into a droplet and quickly transform it in the droplet to form the mercury-two; or you could simply assume that the mercury in the droplet is due to mercury plus two, which is a couple orders of magnitude less in concentration than total gaseous mercury, or it could be a combination of the two. Mercury plus two has been measured in the particulate phase, but not in the gas phase in the atmosphere. However, because of the high volatility of mercuric chloride (the form of the mercury plus two that is thought to predominate), the existence of gaseous mercury plus two cannot be ruled out, especially in the vicinity of sources. Based on some calculations to examine whether or not it could be the particulate or the gas, there appears to be enough particulate mercury in the atmosphere to account for all of the mercury that we see in the rain in Michigan. If you assume some conversion rates that have been cited in the literature, there is probably not enough elemental mercury around to account for the observed mercury in the rain all year round. In the summer time there might be, but definitely not in the winter, since the mechanisms that we think are occurring to convert mercury from the elemental form to the mercury plus two form in the precipitation will not occur in frozen precipitation. Third issue, is there enough mercury being emitted from man-made emission sources in Michigan to account for what is observed in the ambient air? If you assume that the 37,000 tons/year is in the ball park, those emissions can only account for 10% of the total mercury that is observed in Michigan's ambient air. Fourth issue, is there enough emissions of mercury plus two in Michigan to account for the mercury plus two that is observed in the air? This question we cannot answer because none of the emissions data in mercury are

speciated. We have no idea what fraction of that is gaseous elemental and what fraction is mercury plus two. So, this is a key research area that needs to be identified because, unless we answer that, we don't know what the effects of our controls will be.

Dr. Wolff also commented on a couple other related issues: First, there have been some measurements, not in Michigan but elsewhere, that suggest that the ground is a source rather than a sink of gaseous mercury. These data include very good correlations between the daily temperature and the daily mercury levels. These data also show a seasonal dependency with the highest levels in the summer time, the lowest in the winter time. The particulate mercury levels seem to track the gaseous levels at these sites but we are not sure what the significance of that is. Second, and based on a very limited data set, two sites, mercury concentration seems to decrease with increased altitudes. These observations collectively implicate the earth surface as a source of volatilized mercury. This doesn't mean that it is natural. This could be mercury that we emitted years ago, shuffling around the environment.

The final concern deals with the short distance impact of anthropogenic emissions. There are two ways mercury can reach the earth's surface as a result of anthropogenic combustion sources, dry or wet deposition. With dry deposition, calculations can be performed to determine an estimate. Based on the calculations, a slight enhancement of deposition can be expected due

to dry deposition. With wet deposition, you first need to know what form of mercury is coming out of the stack. If gaseous elemental mercury is the dominant form, there will be no local deposition enhancement from a local source. It will just contribute to whatever is happening downwind. If, however, the oxidized form is the dominant form, you are going to see a very localized enhancement, as raindrops falling through the concentrated plume removes some of the particulates and cause an enhanced deposition very locally. There has only been one study that examined this, and the effect of the enhancement was limited to about a kilometer downwind. Beyond a kilometer, the plume seems to be mixed in and the concentration is not high enough because the main mechanism for the ultimate removal of these particulates is not washout. Rather, the plume has to move downwind and get into the cloud, and that is the main mechanism that removes the particulate mercury. So, consequently, there will be a slight enhancement of mercury deposition due to, and near a local source, but the zone of influence of that enhancement is expected to be very limited.

Dr. Fischer asked the Panel whether what is known so far points to putting controls on incinerators and fossil fuel power plants in addition to source reductions, as has been proposed for New Jersey. Drs. Cook, Wolff, and Bulkley agreed that source reduction is important and that it can be accomplished with current technology.

Dr. van Ravenswaay cautioned the Panel that since mercury contamination seems to be a regional problem, recommending controls for Michigan and incinerators and coal-fired plants could put the state at a relative disadvantage. Dr. Cook responded that these controls seemed economically feasible and that if some states take the lead, the federal government may move more quickly to require controls nationwide. Dr. van

Ravenswaay indicated that there is not much data available on control costs. Costs will probably vary from plant to plant due to differences in design features.

Dr. Fischer asked for information about coal washing and its effect on mercury emissions. Is it necessary and is it effective?

Dennis Leonard, Detroit Edison, explained that coal-washing is done primarily to remove pyrite, or iron sulfide, from coal. Some of the mercury is bound in the pyrite, so it is removed in the washing process. Some coals have such low pyrite content that washing is not needed and some have it in such finely divided pieces that washing is ineffective. Michigan utilities, as required by Michigan law, burn low-sulfur coals, which tend to be low in mercury. Detroit Edison data show that as the utility has gone to low-sulfur coal over time, its mercury emissions have also been reduced.

Dr. Fischer asked whether coal could be washed to get rid of the mercury directly. Mr. Leonard answered that he did not think so.

IV. PUBLIC COMMENT

Dr. Hans Posseff commented on the problems in trying to assess pre-industrial background levels of mercury in lakes and aquatic systems and in assessing time trends. Increases or decreases in metals may not be seen in certain lakes, because there is still enough sediment in some lakes to redistribute them into a level of saturation. He thinks the only valid data about trends would come from study of a deep lake where mercury is not at a saturation condition.

Dr. Kay Jones, Zephyr Consulting, commented that the New Jersey mercury assessment will be changed in the near future. The dry deposition mechanism will be dropped and the worse case analysis will be exchanged for the most likely case. Dr. Jones reanalyzed the Iraqi data using median values to eliminate the "tails" and it tended to confirm what Dr. Fischer said about the difficulty of recognizing the adverse effects threshold. He also thinks the dental amalgam problem may be a confounding variable in assessing current human mercury levels.

Tracey Easthope, Ecology Center, commented on the public health risks of mercury, with reference to work on mercury as an endocrine disrupter, the effects of which may not be seen until organisms reach adulthood. She also urged the Panel to suggest a safety factor on exposure. Dr. Fischer asked for any references available supporting the definition of mercury as a endocrine disrupter.

Mr. John Mahan, Gaylord, stated that in his opinion the Panel was in a better position than anyone else to set a reasonable safety factor and urged them to do so. He discussed features of the Great Lakes Water Quality MESB Agreement between Canada and the U.S. concerning restrictions on mercury. He commented that the

assumption of stable background levels may be unwarranted, since levels may be going up globally.

Dennis Leonard, Detroit Edison, pointed out that in the case of Deer Lake, in the Upper Peninsula, the high values of mercury in the fish were the result of an ore waste landfill.

John Hesse, Michigan Department of Public Health, reported that he has reviewed the Algonac study and identified most of the fish eaters. Summaries were distributed to the Panel showing which species were being consumed. He also offered a copy of trend data from Ontario for mercury in fish. He told that Panel that about 10% of Michigan lakes have been tested. Mr. Hesse also informed the Panel about another small data base having to do with mercury levels in humans. Twenty-three people in the Upper Peninsula of Michigan who were eating fish from some of the lakes under advisory were tested, but no elevated blood levels were found.

Dr. Long asked how long mercury resides in blood. Mr. Hesse answered that there is an initial spike, then after 24 hours it drops slowly. Mercury is thought to have a half-life of about 60 days.

Mr. Hesse also reported on testing of people from the 1971 Algonac/South Haven study. The Lake Michigan fish eaters showed no elevated blood levels over the past 20 years. Paint studies from southeast Michigan in 1989 found most mercury is volatilized out of paint in the first 9 months, very rapidly in the first 24 hours. He told the Panel that the Department of Public Health tries to communicate advisories to the most sensitive population through the WIC program, and particularly through childbirth educators in hospitals. The Department has also worked on a simpler, more appealing format for the advisories. Finally, Mr. Hesse expressed concern about occupational exposures as well as accidental home exposures. An educational program may need to be considered. He expressed concern over advising the public about mercury in commercial fish from outside Michigan.

There was further discussion among the Panel and the public commenters about the relative merits of landfills vs. incineration and about the leachability of mercury from ash. Dr. Fischer closed the discussion with a request for data to support the statements being made.

V. FINAL REPORT PREPARATION INSTRUCTIONS

Dr. Fischer made the following Panel subcommittee assignments for the preparation of the first draft of a report responding to the Governor's August 6, 1992 directives:

1. Compile Data (Harrison, Long) and Health Risk (Fischer, Demers and Bulkley)
2. Sources Pathways and Exposure (Premo, Long, Wolff and Olsen)
3. Current Standards and Abatement (Bulkley, Premo and Harrison)

4. Control Options (Wolff, Cook and van Ravenswaay)
5. Further Studies Needed (Each Subcommittee)

Dr. Fischer requested that the subcommittee draft reports and recommendations be submitted to Mr. Harrison upon completion.

The meeting was adjourned at 5:30 pm.

Keith G. Harrison, M.A., R.S., Cert. Ecol.
Executive Director